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(54) IMPROVEMENTS IN OR RELATING TO FERMENTATION

(71) We, BRITISH VISQUEEN LIMITED, of Imperial Chemical House, Millbank, London SW1P 3JF, a British Company do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to fermentation and is particularly concerned with the production of wine, beer, cider or other alcoholic drink on a domestic scale by fermentation.

Specification No. 1 201 183 describes a method of fermenting liquids in which the fermentation reaction is carried out in a disposable bag or sack made from a water-proof sterile material (such as a plastics material) which does not impart flavour to the materials used in the fermentation or to the product of the fermentation and the neck of the bag or sack is sealed in a manner which prevents air from entering the bag from outside but allows gases produced by the fermentation to escape from inside the bag.

Specification No. 1 202 183 also describes a fermenter comprising such a disposable bag or sack, a support for the bag to give it the necessary shape when it holds fermenting liquid, and means for sealing the neck of the bag. Thus the neck portion of the bag may be folded to close the bag and the closed neck held against a portion of the support by means of an elastic band passing round the support, whereby the elastic band functions as a non-return gas outlet valve.

The term "bag" will hereinafter be used to include bags of large size, referred to in the said specification as "sacks".

According to the present invention, a fermenter comprises in combination a plastics-film bag having a narrowed neck terminating at an open mouth, and a means for releasably closing the neck during a fermentation reaction conducted within the

bag, substantially so as to prevent air from entering the bag from outside but to allow gas produced by the fermentation reaction to escape from inside the bag, said means comprising a substantially rigid supporting member and an elastic band for holding the bag neck closed against the supporting member.

The neck of the plastics-film bag is preferably centrally located, but it may be offset to one side if desired, for example to simplify manufacture or to effect economies in the use of the plastics material. One or more suspension holes may be provided in a sealed-off portion or portions of the bag adjacent to the mouth to allow the bag to be suspended for manipulation at any stage, or for the fermentation process.

The bag is preferably made from tubular film of the plastics material, produced by the extrusion-blowing method. Such bags may be made by a continuous process in which successive bag units are sealed and severed from the length. A seal of the desired shape is formed at the mouth end of the bag. The other end may be sealed by a conventional, straight seal across the whole width of the tubing, or the seal may be of other shape if desired. Each bag is preferably severed from the length simultaneously with, or after, the formation of the seals. The seals, themselves are preferably made wide enough to minimise the risk of leakage even should the filled bag be suspended without external support for the seals. The bag should be generally of robust construction; the optimum thickness of the film used for making it will depend largely on the size of the bag, but will generally be in the higher ranges of thickness of conventional packaging films appropriate to the size of the bag. When suspension holes are to be provided, the seals at the mouth end of the bag, or parts of them, are

advantageously made wide enough for the suspension holes to be formed through sealed areas. The seals are preferably made by heat-sealing; films of polyethylene (which in other respects also is a particularly suitable material for the bag) and of some other plastics may of themselves be readily heat-sealed, but heat-seal coatings may otherwise be provided as required.

The bag may be supported during the fermentation process by being suspended from a gantry or other firm support; or it may be placed in a bucket, bin or other support of convenient shape, in which case any suspension holes provided in the bag may be used to steady the top of the bag during the fermentation, or for assistance in filling, emptying or other operations.

A distinction must be drawn between the sealing of the bag for constructional purposes so far described, which is liquid-tight and of a permanent nature, and the closing of the bag mouth against the entry of air from outside but so as to allow the escape of the carbon dioxide produced by fermentation. Such closing is accomplished by means of the releasable closure and may be effected at the start of the fermentation process. In one such method of closing the bag, the neck portion of the bag is flattened and folded over an elongated supporting member, and held in such position beneath an elastic band stretched longitudinally around the supporting member. Such a supporting member may rest at its ends on the rim of a bucket or bin, which may be suitably notched to receive it. The supporting member may alternatively be located on the rim by means of adjustable stops provided at each end of the member.

The invention will now be further described by way of example with reference to the drawings accompanying the provisional specification of which:

Figure 1 is a front elevation of a suitable fermentation bag;

Figure 2 is a sectional elevation of a bucket or bin containing the bag of Figure 1; and

Figure 3 is a perspective view corresponding to Figure 2.

The bag shown in Figure 1 is formed from a length of plastics lay-flat tubular film, suitably of polyethylene, a side fold of which is shown at 4. The bottom of the length is closed by a straight seal, 5, and the top is sealed and cut away so as to form the neck, 6, of a bottle-shaped bag, the neck and shoulders being defined by seals, 7. The seals 5 and 7 are wide and strongly heat-sealed. Holes, 8, are provided in the wide seals 7 so that a bar or bars can if necessary be pushed through the holes to steady the bag while it is being filled or while it is in use. The bars may fit upon

the rim of a bucket or bin in which the bag may be supported for external strength when in use. Alternatively, the filled bag may be suspended at the holes 8 for the fermentation process, from a suitable support.

Figures 2 and 3 show the bag of Figure 1 supported in a bucket or bin, 9. The bag contains fermenting liquid 10, and the neck 6 is closed as explained below. For clarity, a space is shown between the bag and the bucket in Figure 2, but in practice the bag is in contact with the walls and bottom of the bucket or bin, which provide support for the liquid in the bag. The bucket or bin is preferably of plastics material and may be provided with a handle 11.

The neck 6 of the bag is held closed upon a rigid supporting member that comprises a flat portion, 12, rigidly secured to a rod, 13. The ends of the rod 13 rest on the rim of the bucket or bin, and stops 14, which are provided on the ends of the rod 13, serve to locate the rod upon the rim. The stops 14 are adjustable by having either a threaded connection with, or a friction fit on, the rod ends. The neck 6 of the bag is folded over the central part of the rod 13, and is held against both sides of the flat portion, 12, of the supporting member by means of an elastic band, 15, passing longitudinally round the flat portion 12. This arrangement serves as a non-return valve during the fermenting process, allowing gases from the fermenting liquid to escape through the neck of the bag. It is found that, because of the high strength of the closing effect of the elastic band, which presses the neck 6 against the supporting member, a positive gas pressure is required inside the bag to overcome the sealing effect. The rod 13 may be made as long as is necessary to span the rim of the bucket or bin holding the bag, and the supporting member may be formed from any suitable material, for example from wood, plastics, aluminium or stainless steel. The rod may be in telescopic form so that it can be reduced in length for packing or storage purposes.

The fermenter of the present invention may be used in fermenting sugar-containing mash with various yeasts in order to make potable products such as beers, wines and cider. The fermenter bags may be used in forming packages of raw materials, for example, malt extract, that are fermentable in the presence of water and a yeast. These materials may be packed in the bags immediately after manufacture or at a later stage, and sealed in the bags, preferably by heat-sealing the edge of the bag mouth. The purchaser of such a bag may subsequently cut off the seal before adding water and yeast to the contents of the bag

to produce fermentation, and the bag neck may then be releasably closed in the manner described. The use of the bags in this manner can have obvious advantages in saving packaging costs. If the bags are used in this way, an additional closure, for example a closure of the tongue-and-groove type, may be provided part-way up the bag, to retain the contents in the lower part of the bag. This closure may be opened when the bag. This closure may be opened when to be added to dissolve the stored ingredient, followed by the other ingredients, for the fermentation process to be initiated.

15 WHAT WE CLAIM IS:—

1. A fermenter comprising in combination a plastic-film bag having a narrowed neck terminating at an open mouth, and a means for releasably closing the neck during a fermentation reaction conducted within the bag, substantially so as to prevent air from entering the bag from outside but to allow gas produced by the fermentation reaction to escape from inside the bag, said means comprising a substantially rigid supporting member and an elastic band for

holding the bag neck closed against the supporting member.

2. A fermenter as claimed in Claim 1 in which the neck of the bag is centrally located.

3. A fermenter as claimed in Claim 1 or Claim 2 in which the bag is provided with one or more suspension holes in a sealed-off portion or portions of the bag adjacent to the neck thereof.

4. A fermenter as claimed in any one of the preceding claims in which the supporting member is an elongated member around which the elastic band may be stretched longitudinally thereof to hold the bag neck folded over upon the elongated member.

5. A method of fermenting a liquid in which the fermentation reaction is carried out in the plastics-film bag of a fermenter as claimed in any one of the preceding claims, with the mouth of the bag in the releasably-closed condition.

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PROVISIONAL SPECIFICATION

2 SHEETS

*This drawing is a reproduction of
the Original on a reduced scale*

Sheet 1

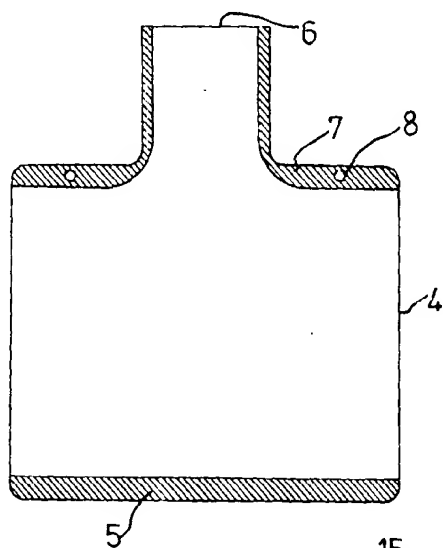


FIG. 1.

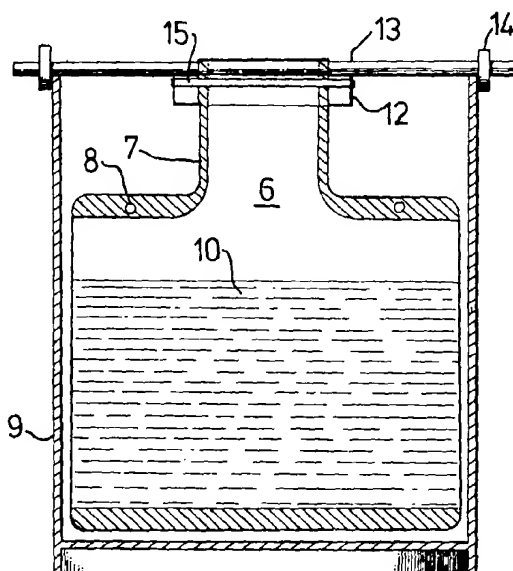


FIG. 2.

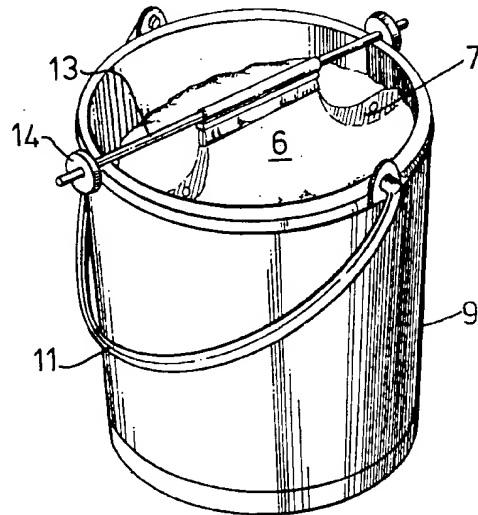


FIG 3